

CALIFORNIA PUBLIC EMPLOYEES' RETIREMENT SYSTEM
ACTUARIAL AUDIT REPORT
MARCH 2011

March 11, 2011

David Lamoureux
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Sacramento, CA 95811

Dear David:

Subject: Actuarial Audit of the 1997-2007 Demographic Experience Study

Gabriel, Roeder, Smith & Company ("GRS") is pleased to present this report of an Audit of the 1997-2007 Demographic Experience Study of the California Public Employees' Retirement System ("CalPERS" or "the System"). We are grateful to the Actuarial Office for their cooperation throughout the Audit process.

The main objectives of the Actuarial Audit were to:

- Review of the processes used by the CalPERS Actuarial Office to analyze the data and derive the new actuarial assumptions; and
- Determine if the assumptions adopted by the Board were reasonable, appropriate and in accordance with generally accepted actuarial principles.

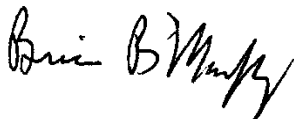
GRS is pleased to report to the Actuarial Office and Board that, in our professional opinion, we believe the assumptions adopted by the Board are reasonable and, compared to the prior assumptions, provide a more accurate representation of the System's liabilities and costs.

Throughout this report we will document the results of our investigation and findings. We will also provide several suggestions for the Actuarial Office to consider when they perform the next demographic experience study. We hope the Staff and Board find these items helpful.

Thank you for the opportunity to work on this important assignment.

Respectfully submitted,

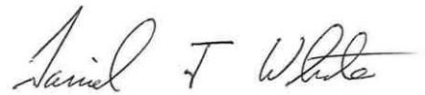
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SECTION I

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The actuarial audit involves a comprehensive review of the work performed by the Actuarial Office of the California Public Employees' Retirement System ("CalPERS" or "the System") in calculating the current assumptions that are documented in the 1997-2007 Demographic Experience Study.

The scope of the review included:

- An independent calculation of the exposures and decrements for each assumption using the same ten years of experience data used by the Actuarial Office in their analysis.
- A comparison of the results of the exposures, decrements, and crude probability rates determined by the Actuarial Office to those that we independently calculated for accuracy and reasonableness.
- A review of the process the Actuarial Staff used to refine the crude rates to develop the current assumptions.
- Identify processes and methods for the Actuarial Office to consider when they perform the next demographic assumption review to further improve the assumption setting process.

Gabriel, Roeder, Smith & Company ("GRS") is pleased to report that, in our professional opinion, we believe the assumptions adopted by the Board are reasonable and, compared to the prior assumptions, provide a more accurate representation of the System's liabilities and costs. We think the methods and processes for gathering and analyzing the data were sound. Even though, given the same data, there are instances where we might have arrived at a slightly different assumption, the current assumptions developed as a result of those processes are reasonable, comply with actuarial standards of practice and the use of such assumptions complies with Governmental Accounting Standards Board ("GASB") Statement Numbers 25 and 27.

Through our review we also identified some processes and methods for the Actuarial Office to consider when it performs the next assumption review. These include:

- Consider incorporating additional margin in the mortality assumption.
- Ensure that the calculation of the exposures, decrements, and rates are applied consistently for all assumptions, and are consistent with the method used by the valuation software.
- Investigate the potential benefits of utilizing alternative weighted approaches in the assumption setting process, for example, weighting by liability, salary level, or benefit level.
- Revisit the merit and promotional salary scale when performing the economic assumption review to ensure the assumption is appropriate when combined with the economic assumption.

In-depth discussions of our investigation are in Sections II through IV of this report. GRS has also separately provided the Actuarial Office an electronic copy of the detailed results of our analysis, which include the comparison of the exposures, decrements, and crude rates that we calculated to those determined by CalPERS.

SECTION II

METHODOLOGY AND PROCESS

COMPREHENSIVE REVIEW OF PROCESS AND METHODOLOGY

GRS methodologies for replicating the analysis

Based on our preference to have consistency between the methods used to group the data in the experience study with the valuation software and the fact that CalPERS valuation program is structurally identical to our internal valuation system, we performed our independent analysis using our internal proprietary experience study software. This add-on to our valuation software is designed to mirror the calculation process and methods used by the valuation program. This is important as it enables the actuary to develop assumptions that are specifically tailored and optimized for the valuation program they are using.

Therefore, our analysis included more than simply recreating the work produced by the Actuarial Office. It also identified whether the current assumptions proved to be reasonable when also used by their internal valuation software to calculate the liabilities and cost. This investigation process involved recreating the data files for each year of the analysis and performing a valuation to capture and compare the actual and expected experience. This was performed twice: once using the prior assumptions and again based on the current assumptions. The output from this process was used by our experience study software to develop a database, which was ultimately used in the assumption analysis.

Using this investigative process, we were able to validate the work performed by the Actuarial Office and determine the current assumption set is reasonable and appropriate.

Determination of exposures and decrements, including a review of methodology for calculating the member age and service

Ultimately, the assumptions derived from the experience study will be used by the valuation program to calculate the liability for each member and eventually the contribution requirement for each employer. We believe it is important for the exposures and decrements in the experience study to be determined in a manner consistent with how it will be applied by the valuation program. For example, if the valuation will use a rounded age on the valuation date to identify the probability rate from a decrement assumption, then it is important that the experience study group the membership in the same way. The idea is that if the crude (actual) decrement rates were rerun in the valuation, the process should create a “perfect” fit to the actual experience across the entire age and service spectrum of the assumption.

This is especially important for the analysis of the retirement assumption since a member moves from a not-eligible to eligible condition in the first year they are retirement eligible. If a group of members are treated as exposed in the experience study but the valuation program does not expose this group in the same manner, then the assumed rate of retirement may no longer be reasonable for this group.

The valuation software utilized by the Actuarial Office is programmed to determine the age and service for eligibility using the nearest age at the beginning of the year. For the salary increases, termination rates, and retirement patterns (which also use service to group the members), the valuation system uses a modified calculation of service which derives the number of years a member is from when they first became a member (i.e. their entry age).

For the experience study, the Actuarial Office used the nearest age on the valuation date which is consistent with the valuation software. However, the calculation of a member's service calculations was based on the member's attained service on the valuation date. This could produce some inconsistencies in the valuation process, especially for the retirement pattern. For example, the valuation does not identify members who are grouped at age 49 to be eligible for retirement during the year; but in actuality, they may become eligible during the year and actually retire. We recommend the Actuarial Office closely inspect this potential issue in the next experience study to ensure that the experience study and the valuation software are consistent in their calculations.

Even though some of the exposure patterns for some of the assumptions did initially appear to be slightly different than our independent calculations, the current assumptions determined by the Actuarial Office are still reasonable. Differences in the exposure patterns were largely mitigated when the crude rates were graduated to develop the current assumption.

Review grouping of members for assumption development

The Actuarial Office examined various ways to organize members into various groups based on characteristics such as gender and employer type for developing the different demographic assumptions. Their investigation of the different combinations is documented in their report.

We initially found it interesting that the Actuarial Office chose to use a unisex assumption for many of the decrements, including disability, retirement and termination. However, as we found the experience for males and females to be largely similar for these assumptions, the use of a unisex assumption seems reasonable. We should note, while there was some noticeable differences in the male and female experience for some of the public safety employers, such as the termination experience for the California Highway Patrol, there are also very few female members in this group. Therefore, we consider the utilization of a unisex assumption in these instances to also be reasonable.

Overall, the final groupings used to develop the current assumptions appear to be reasonable.

Review of graduation methods

The Actuarial Office used a variety of methods for using the crude rates to develop the current assumption. These methods include (1) developing a linear function to minimize the difference of least squares, (2) applying a set of three linear segments to fit the data at various ages, (3)

adjusting the prior assumption by applying a multiplier to certain age and/or service segments, and (4) using multidimensional parametric modeling (i.e. a modified Whittaker-Henderson formula). Ultimately, it is the actuary's judgment for determining the appropriate method to graduate the crude rates.

In our review of the development of the "smoothed" assumptions, we assessed the appropriateness of the graduation method by examining the relative significance and complexity of the assumption. We also reviewed the results of the method, paying particular attention to actual to expected ratios ("A/E ratio") across each age and/or service band, for the entire assumption range for reasonableness, in addition to the A/E ratio on an aggregate basis.

In summary, the graduation methods used for each of the assumptions appeared reasonable and resulted in an acceptable A/E ratio across the entire age/service range of the assumption.

Valuation Process

We often use the experience study process to validate that current processes used by the valuation software are optimal. Using the retirement analysis from above as an example, the current methodology of using years from entry age to determine the retirement probability may not be the most efficient manner to apply that decrement. Rather, it might be more efficient to calculate the eligibility conditions based on the member's actual age and service during the exposure period.

Additionally, the Actuarial Office may want to consider changing the date used to determine the grouped age and service of the member from the beginning of the year to the decrement time (middle of year). This would better identify members who are not eligible to retire as of the valuation date, but who would become eligible during the year and who should be given exposure to the retirement decrement in the valuation.

Note, both these changes would need to be made at the same time to ensure the calculation of the exposures and decrements for the experience study and for valuation purposes continue to remain in sync. We do not feel this would result in materially different liabilities or cost compared to the current method, but would be more consistent with how a member may actually decrement through the valuation.

SECTION III

REVIEW OF DEMOGRAPHIC ASSUMPTIONS

REVIEW OF DEMOGRAPHIC ASSUMPTIONS

In this section, we will discuss our observations on each particular demographic assumption, noting specific observations that are worth commenting on.

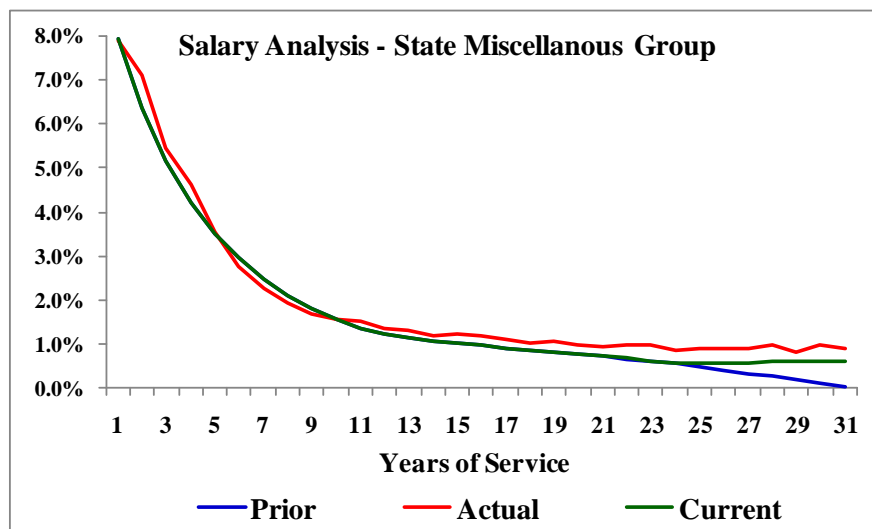
Salary Scale

Our analysis only focused on the seniority, merit, and promotional component of the salary increase assumption. It is our understanding that the underlying wage inflation assumptions will be studied in a separate economic assumption analysis.

The CalPERS report stated that the analysis was performed two ways: using a transverse method as well as another method, specifically described in the book entitled “Fundamentals of Private Pension Plans.” In our opinion, both of these methods are appropriate for studying promotional and merit increases.

However, both of these methods are based on open groups of data, meaning the data from the beginning and ending periods are not exactly the same since several members from the beginning of the year will have terminated or retired by the end of the year. Therefore, we reviewed this assumption using a closed group approach in which individual members are matched between the two years and only members in both years would be included in the analysis. We believe this approach is also reasonable and provides a third, independent analysis to validate the appropriateness of the current assumption.

In general, we found the current assumptions to be reasonable and agree with the increase in the assumed rates for members later in their careers. This was consistent across all groups. The following chart provides the analysis for State Miscellaneous employees, which was one of the larger employer groups in the assumption set.



Since a member's benefit from a State employer is based on an average of their last 12-months rate of pay at the time of retirement, it is possible that the apparent higher average increases for the cohort of members with more than 25 years of service may actually be attributable to a relatively small number of members receiving above average compensation increases near or in their final year of employment (typically referred to as "salary spiking"). When the next demographic analysis is performed, we suggest the Actuarial Office consider investigating the prevalence of salary spiking, and whether the increases are built into the compensation assumption or if a separate, salary-spiking assumption, should be utilized. It is unclear whether a higher average salary increase assumption will produce similar liabilities as a salary-spiking assumption for members in their final year.

We also recommend that the step-rate, demographic portion of the salary scale be revisited during the economic experience study to ensure the assumption is appropriate when the economic and demographic components of the salary assumption are combined.

Post-Retirement Mortality

The post-retirement mortality assumption is used to model the life expectancy for members after they have left employment. Besides using separate assumptions for males and females, there are separate mortality rates for service retirees and disability retirees. CalPERS investigated this assumption using ten years of experience. However, due to observed improvements in mortality, only the last five years of experience was used in developing the updated assumptions.

The following table provides a comparison of the calculation results for the service and disability retirees. We were pleased with the close proximity in the counts at each age and service band, as well as in total, to those determined by CalPERS.

Post-Retirement Mortality for Service Retirees				
	Actual Experience		Expected Deaths	
	Deaths	Total Exposures	Prior Assump	Current Assump
Male Experience	(1)	(2)	(3)	(4)
GRS	22,938	653,119	24,198	21,710
CalPERS	<u>22,938</u>	<u>653,230</u>	<u>24,193</u>	<u>21,705</u>
Difference	0	(111)	5	5
% Difference	0.0%	0.0%	0.0%	0.0%
Female Experience				
GRS	22,465	810,416	22,657	22,703
CalPERS	<u>22,465</u>	<u>810,436</u>	<u>22,684</u>	<u>22,094</u>
Difference	0	(20)	(27)	609
% Difference	0.0%	0.0%	(0.1%)	2.7%

Post-Retirement Mortality for Disability Retirees				
	Actual Experience		Expected Deaths	
	Deaths	Total Exposures	Prior Assump	Current Assump
Male Experience	(1)	(2)	(3)	(4)
GRS	4,549	176,883	5,016	4,219
CalPERS	<u>4,550</u>	<u>176,947</u>	<u>4,779</u>	<u>4,754</u>
Difference	(1)	(64)	237	(535)
% Difference	0.0%	0.0%	4.7%	12.7%
Female Experience				
GRS	2,652	108,036	2,777	2,575
CalPERS	<u>2,652</u>	<u>108,035</u>	<u>2,786</u>	<u>2,695</u>
Difference	0	1	(9)	(120)
% Difference	0.0%	0.0%	0.3%	(4.7%)

The Actuarial Office also incorporated five years of projected improvement in the mortality rates using the Scale AA published by the Society of Actuaries. We believe the mortality assumption is within a range of reasonable assumptions. We also believe its inclusion of margin in the mortality assumption and the resulting documentation complies with the Actuarial Standards of Practice ("ASOP") No. 35 requirements regarding mortality improvement.

Future improvement in mortality and longevity is a debated topic. While almost all practitioners and experts in this area agree that there will be continued improvement in the average life expectancy, there are different opinions regarding how quickly the improvements will occur and where the ultimate fundamental level of life expectancy will be. Given the long-term nature of the benefit obligations promised by the System and the rate of change in the historical mortality experience, we recommend CalPERS consider incorporating more than five years of future improvement during the next assumption review.

The Actuarial Office may also want to explore other indicators of mortality experience, such as occupation and salary level. We caution, however, that a more complex assumption may impact other areas of the plan's operation and administration, such as the development of factors for optional forms of payment and service purchase factors, before adopting. CalPERS will need to determine if the possible improvement in calculating the System's liabilities is worth the additional complexity in benefit administration.

Pre-Retirement Mortality

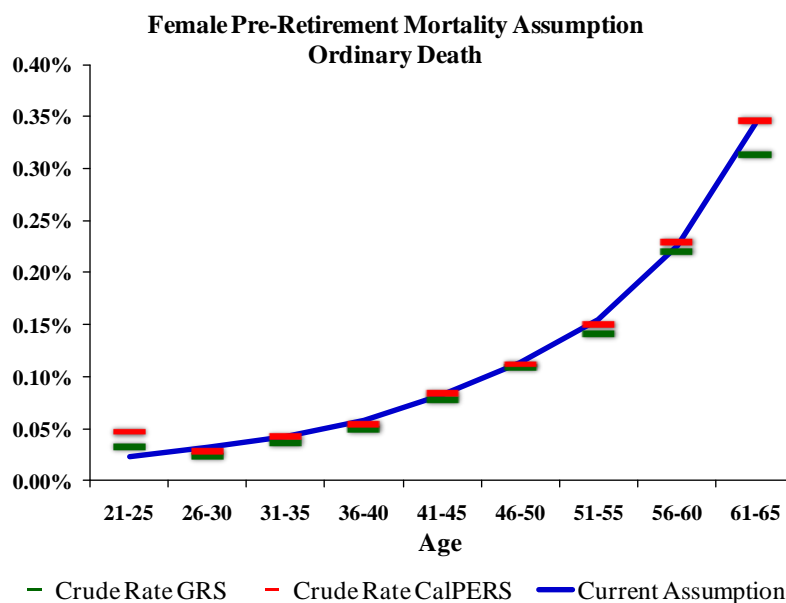
The pre-retirement mortality assumption is used to model the likelihood that a member dies because of work related or non-work related causes while an active employee with a participating employer. For purposes of this analysis, ten years of experience was analyzed, and members from all the various state and public agency groups were combined to increase the credibility of the analysis.

The following table provides a comparison of the exposures, actual deaths and expected deaths (non-work related only) calculated by the Actuarial Office and GRS.

Pre-Retirement Mortality (Ordinary)				
	Actual Experience		Expected Deaths	
	Deaths	Total Exposures	Prior Assump	Current Assump
Male Experience	(1)	(2)	(3)	(4)
GRS	5,318	3,239,682	4,327.8	5,277.1
CalPERS	<u>5,255</u>	<u>3,222,535</u>	<u>4,290.3</u>	<u>5,226.7</u>
Difference	63	17,147	37.5	50.4
% Difference	1.2%	0.5%	0.9%	1.0%
Female Experience				
GRS	4,463	3,856,962	3,677.0	4,701.3
CalPERS	<u>4,454</u>	<u>3,523,067</u>	<u>3,474.4</u>	<u>4,423.4</u>
Difference	9	333,895	202.6	277.9
% Difference	0.2%	8.7%	5.5%	5.9%

As the tables show, GRS closely matched CalPERS calculations of the exposures and actual decrements for the males. However, while we matched very close on the female decrements, there was a fairly large difference in the number exposed. After investigating processes CalPERS utilized, we identified an anomaly in the data work that resulted in the understatement of the exposures for members between the ages of 22 and 53 during their first year of service.

This difference resulted in the CalPERS staff slightly overstating the crude rates and potentially over adjusting the mortality assumption for female members. The graph below compares the crude mortality assumption calculated by GRS and CalPERS, as well as the current assumption adopted by CalPERS.



As the chart shows, while there are marginal differences between the crude rates and the current assumption, we believe the new assumption is within a reasonable range of an acceptable assumption. In addition, given the relative insignificance of this assumption, we do not feel there is a need to update this assumption prior to the next scheduled demographic review.

Disability

CalPERS uses separate assumptions for disability that result from work related and non-work related occurrences. Differences in experience also show that separate assumptions for the various State and public agency organizations are also warranted.

The following tables provide a comparison of the calculated information by GRS and CalPERS for the work related and non-work related disability decrements.

INDUSTRIAL DISABILITY								
Group	Exposures				Actual Decrements			
	CalPERS	GRS	% Diff	Actual Diff	CalPERS	GRS	% Diff	Actual Diff
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CHP	66,715	67,291	-0.9%	(576)	954	952	0.2%	2
IND	85,605	84,378	1.5%	1,227	31	31	0.0%	0
POFF	390,782	392,498	-0.4%	(1,716)	2,753	2,728	0.9%	25
Safety	147,871	149,532	-1.1%	(1,661)	949	942	0.7%	7
PA - CPO	92,770	99,317	-6.6%	(6,547)	679	717	-5.3%	(38)
PA - Fire	143,778	144,521	-0.5%	(743)	1,551	1,551	0.0%	0
PA - Police	225,680	220,326	2.4%	5,354	3,277	3,235	1.3%	42

Note: Exposures and actual decrements are for ages 21 through 80.

ORDINARY DISABILITY								
Group	Exposures				Actual Decrements			
	CalPERS	GRS	% Diff	Actual Diff	CalPERS	GRS	% Diff	Actual Diff
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CHP	66,194	54,759	20.9%	11,435	13	13	0.0%	0
IND	85,801	62,923	36.4%	22,878	412	402	2.5%	10
MISC	1,332,310	1,025,160	30.0%	307,150	3,976	3,762	5.7%	214
POFF	389,397	299,473	30.0%	89,924	214	213	0.5%	1
Safety	147,509	108,201	36.3%	39,308	298	296	0.7%	2
School	2,344,858	1,630,263	43.8%	714,595	4,838	4,837	0.0%	1
PA - CPO	92,461	72,031	28.4%	20,430	73	75	-2.7%	(2)
PA - Fire	142,977	118,894	20.3%	24,083	42	42	0.0%	0
PA - MISC	1,822,973	1,250,086	45.8%	572,887	3,788	3,787	0.0%	1
PA - Police	217,208	173,248	25.4%	43,960	103	102	1.0%	1

Note: Exposures and actual decrements are for ages 21 through 80.

The relatively large differences in the exposures for the non-work related decrement is a result of CalPERS including exposures when the member is not yet eligible for a benefit in its analysis.

Since this is an age-related assumption, the inclusion of these individuals in the analysis, slightly understated the actual crude rates, and thus the current assumption.

Even though the current assumption was not adjusted to be equal to the actual experience, we believe the current assumption is still within the range of a reasonable assumption. Therefore, we are not recommending a change until the next demographic assumption review is performed.

Termination

Termination rates reflect members who leave for any reason other than death, disability, or service retirement. They apply whether the termination is voluntary or involuntary. The System utilizes two termination assumptions, one to determine the probability a member terminates employment and requests a refund, and a second assumption to model the likelihood that a member terminates and keeps his/her account balance on deposit.

We modeled the termination assumption on a combined basis (i.e. we focused on the members who left employment regardless of whether they kept their contributions in the System or not) and then investigated the reasonableness of the division between refunds and a deferred vested benefit. Conversely, the Actuarial Office separately calculated these rates. Therefore, to compare our results we summed the CalPERS analysis and then compared to the results we determined.

Below is a table with the results of that comparison.

TERMINATION FROM EMPLOYMENT								
Refund and Vested Deferrals Combined								
Group	Exposures				Actual Decrements			
	CalPERS	GRS	% Diff	Actual Diff	CalPERS	GRS	% Diff	Actual Diff
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CHP	54,605	54,481	-0.2%	124	470	470	0.0%	0
IND	70,805	69,040	-2.5%	1,765	1,929	1,920	-0.5%	9
Misc	1,122,235	1,112,709	-0.8%	9,526	40,110	40,044	-0.2%	66
POFF	325,894	324,828	-0.3%	1,066	7,965	7,953	-0.2%	12
Safety	127,480	127,586	0.1%	(106)	4,522	4,544	0.5%	(22)
School	2,093,747	2,092,478	-0.1%	1,269	129,318	129,296	0.0%	22
PA - CPO	75,260	80,625	6.7%	(5,365)	2,523	2,651	4.8%	(128)
PA - Fire	117,755	116,974	-0.7%	781	1,599	1,599	0.0%	0
PA - MISC	1,535,820	1,531,747	-0.3%	4,073	89,202	89,174	0.0%	28
PA - Police	179,270	178,489	-0.4%	781	3,796	3,796	0.0%	0

Note: Exposures and actual decrements are for service years 1 through 30. The decrements include termination with a vested benefit and refunds.

As the results show, GRS matched CalPERS calculations reasonably well for both the exposures and decrements. We also believe the relative division between refunds and deferred vested benefits are reasonable, which include the refund assumption when the member is also eligible to immediately commence a service retirement benefit. We also reviewed the grouping selected by

the Actuarial Office, which included grouping all members regardless of gender, and certain employers together (e.g. all public agency miscellaneous employers are grouped together regardless of their benefit structure).

While there was some difference in termination behavior for males and females within several of the public safety groups, such as the California Highway Patrol, we believe the Actuarial Office's decision to combine the experience and utilize a unisex assumption due to the relatively insignificant number of females was reasonable.

We believe the new termination assumptions for the other groups are also reasonable.

Service Retirement

The service retirement assumption is used to model the expected number of members that terminate employment and immediately commence their retirement benefit. We believe the report accurately disclosed the process used by the Actuarial Office to develop the exposures and decrements. We also think the membership groups have been appropriately analyzed on a separated basis based on their applicable benefit provisions. The Office's exclusion of observation periods before and after an agency experienced a change in its benefit provisions, such as an improvement in the retirement benefit structure were also reasonable.

The following tables provide a comparison of the calculated information by GRS and CalPERS for the retirement decrement when we utilized the same process for membership grouping and the inclusion of observation periods.

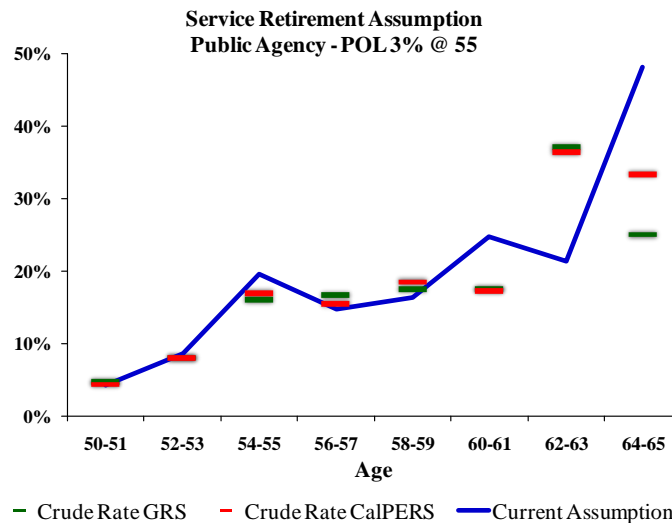
Group	SERVICE RETIREMENT							
	Exposures				Actual Decrements			
	CalPERS	GRS	% Diff	Actual Diff	CalPERS	GRS	% Diff	Actual Diff
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CHP	6,508	6,490	0.3%	18	955	951	0.4%	4
IND	17,652	17,419	1.3%	233	1,412	1,356	4.1%	56
MISC	378,224	366,487	3.2%	11,737	32,598	31,218	4.4%	1,380
POFF	55,231	55,096	0.2%	135	6,334	6,273	1.0%	61
Safety	42,363	42,748	-0.9%	(385)	3,397	3,397	0.0%	0
School	581,845	595,438	-2.3%	(13,593)	43,248	43,824	-1.3%	(576)
PA - Fire 3% @ 50	7,464	7,475	-0.1%	(11)	993	994	-0.1%	(1)
PA - Fire 3% @ 55	3,053	3,051	0.1%	2	340	339	0.3%	1
PA - Misc 2.5% @ 55	15,406	15,690	-1.8%	(284)	1,623	1,659	-2.2%	(36)
PA - Misc 2.7% @ 55	25,294	25,720	-1.7%	(426)	2,656	2,705	-1.8%	(49)
PA - Misc 2% @ 55	295,752	299,910	-1.4%	(4,158)	23,003	23,428	-1.8%	(425)
PA - Misc 2% @ 60	46,684	47,530	-1.8%	(846)	2,783	2,893	-3.8%	(110)
PA - Misc 3% @ 60	17,739	18,101	-2.0%	(362)	1,654	1,696	-2.5%	(42)
PA - POL 3% @ 50	14,929	14,515	2.9%	414	2,639	2,551	3.4%	88
PA - POL 3% @ 55	1,879	1,458	28.9%	421	211	162	30.2%	49

Note: Exposures and actual decrements are for ages 50 through 70.

Overall, we were pleased with the comparable differences in exposures and decrements. As the

table shows, with the exception of the Public Agency – POL 3% @ 55 group, GRS closely matched CalPERS's calculations of the exposures and actual decrements. We discussed the differences with the Actuarial Office to try to identify the source of the variance for the assumption for this group. These conversations were successful in identifying some of the differences, but not all of them.

The graph below compares the crude retirement rates that were independently calculated by GRS and CalPERS, as well as the current assumption adopted by CalPERS for this benefit group.



Similar to the pre-retirement mortality assumption for females, even though there was a large difference in the number of exposures and decrements, there is only a marginal difference in the crude retirement rates that were independently calculated by GRS and CalPERS. We should note, while there appears to be a large difference in the crude rates for the 64-65 age range, it is only because there was very little experience, as the majority of the members retire before attaining those ages.

As a result, we believe the current retirement assumption, including the retirement assumption for the Public Agency – POL 3% @ 55 group, is within a reasonable range of an acceptable assumption.

We also believe the current utilization of an assumption based on the member's service and entry age is acceptable. However, we recommend that CalPERS consider modifying the structure of the assumption to be based on the member's current age and service. Changing the structure of the assumption will not affect the liabilities, but will be more in sync with internal processes of the valuation software used for calculating the members' liability and cost. This format may also be easier for the staff to check and validate the calculations for individual test lives.

Review of Other Demographic Assumptions

The actuarial valuation utilizes additional demographic assumptions that were not included in the 1997-2007 demographic assumption review performed by the Actuarial Office. For completeness, below is a list of these demographic assumptions disclosed in the report. Since we did not receive the data to verify these assumptions, our comments regarding reasonableness is based on our experiences working with other large, statewide retirement systems.

We recommend that the Actuarial Office incorporate a review of these assumptions into the next assumption review. In lieu of performing a comprehensive review, an alternative approach to investigating these might include reviewing an appropriate random sample of actual members and verifying the assumption based on that sample.

Marital Status:

An assumption for the percentage married upon retirement is especially important for plans that include a subsidized surviving spouse benefit in the form of payment provided to the retiree. Since many of the plans in CalPERS include a 25% survivor spouse subsidy, an assumption should be included in the valuation. Currently, CalPERS assumes that 90% of public safety employees and 85% of the non-public safety employees are married to an eligible spouse when they retire and commence retirement benefits.

Based on our experience working with other large statewide retirement systems, we find this assumption to be reasonable and to probably include some margin. We would not recommend changing this assumption before the next assumption review.

Age of Spouse:

Along with making an assumption for the percentage of members that are married to an eligible spouse at the time of retirement, it is also important to make an assumption regarding the spouse's age. Currently, it is assumed that female spouses are three years younger than male spouses.

Again, based on our experience working with other retirement systems, assuming a three year age difference for female spouses is by far the most common assumption. Based on this fact and a lack of data to indicate otherwise, we find this assumption to be reasonable.

Service Retirement Assumption for Separated Vested Members:

This assumption is used to model when members who terminated employment prior to becoming eligible to commence a retirement benefit, and do not elect a refund of contributions, would subsequently commence their benefit. The report prepared by the Actuarial Office noted this was the first time this assumption was comprehensively studied. The Actuarial Office updated this assumption from assuming benefits would commence at earliest retirement age to an

assumption that is based on a multiplier of the associated retirement assumption for an active member.

In aggregate, the liability for separated vested members is relatively insignificant compared to the liability attributable to active and retired members. However, there are likely several individual employers with a relatively significant portion of their liability attributable to separated vested members. This assumption is particularly significant and material to these employers.

The process and methods used by the Actuarial Office are appropriate and the modified (i.e. current) assumption also appears to be reasonable. We suggest the Actuarial Office monitor the emerging experience and actuarial gain/loss that is attributable to these groups of members, especially for those employers who have a significant portion of their liability attributable to separated vested members.

Credit for Unused Sick Leave:

Certain employers in CalPERS provide additional service credit to the member's years of service for any accumulated unused sick leave at the time of retirement at the rate of 0.004 years for each day. Providing credit for unused sick leave can have a material effect on the benefit provided to System members. Therefore, if the valuation data does not include a data element identifying the member's current balance of unused sick leave, it is an important to make an assumption regarding the potential level of this amount.

The current assumption increases the member's Final Average Salary by 1% for the groups providing this unused sick leave credit. Since the member's benefit is equal to a benefit multiplier times their final average salary times their years of service, this has the same effect as providing a 1% load to the member's years of service. Since the conversion rate provides 0.004 years for each day, the 1% load assumes members will, on average, terminate with 2.5 days per year of service of eligible unused sick leave that will be converted to credited service.

Due to variability that may exist regarding the generosity of the various sick leave benefit programs, as well as possible organizational cultures that may influence the sick leave utilization, we are unable to comment regarding the reasonableness of this current assumption

SECTION IV

CONSIDERATIONS WHEN PERFORMING THE NEXT STUDY

CONSIDERATIONS WHEN PERFORMING THE NEXT DEMOGRAPHIC EXPERIENCE STUDY

Through our review, we have identified some processes and methods for the Actuarial Office to consider when it performs the next assumption review. These include:

- Consider incorporating additional margin in the mortality assumption.
- Ensure the calculation of the exposures, decrements, and rates consistently for all assumptions and consistent with the valuation software.
- Investigate the potential benefits of a liability weighted approach in the assumption setting process.
- Consider modifying the timing for determining the member's benefit eligibility in the valuation system from the beginning to the middle of year.
- Review the overall salary assumption when performing the economic assumption review to ensure it is appropriate when the economic and demographic components of the salary assumption are combined.
- Perform at least a limited review of the minor demographic assumptions that were not included in this experience study. These include the percentage of members who are expected to be married at retirement, the age difference for male and female spouses, and the credit for unused sick leave.

We also suggest the Actuarial Office consider changing the timing used to determine the grouped age and service of the member from the beginning of the year to the decrement time (middle of year). We believe this will improve the modeling and valuation of members who become eligible to retire during the year. In addition, we recommend the basis used to group the retirement pattern be changed from the entry age to an actual determination of the age and service in the year of exposure. We want to reiterate that these last two suggestions should not be made between demographic assumption reviews. This is because it is important the assumptions are developed in the same manner that the valuation calculates the member's age, service, and eligibility.

Again, we hope you find these suggestions helpful when you perform the next demographic assumption review. Given the planned schedule for the next demographic assumption review, the timing of this report is favorable with regard to your internal planning to perform the next analysis.